

REMARKS

Status of Claims

Claims 1–4, 6, 9–24, 26, 29–34, 36, and 39–40 were pending and were rejected. No claims are amended herein. Claims 1–4, 6, 9–24, 26, 29–34, 36, and 39–40 remain pending. Reconsideration and withdrawal of the rejections are requested in view of the following remarks.

Rejection Under § 103

Claims 1–4, 6, 9–24, 26, 29–34, 36, and 39–40 were rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent 6,360,017 to Chiu et al. (“Chiu”) in view of U.S. Patent 6,618,507 to Divakaran et al. (“Divakaran”).

A *prima facie* obviousness rejection requires, among other things, that the proposed combination of references teach each element of the recited claims and that there be some reason one of ordinary skill in the art would combine the teachings of the two references. However, the proposed combination of Chiu and Divakaran fails to teach or suggest many of the limitations of the claims presented in the instant application. Additionally, the rejection provides no reason to combine the references.

The following remarks address independent claim 1 only. However, each independent claim includes similar limitations and is therefore allowable for at least the same reasons. Similarly, the dependent claims each incorporate such limitations from the corresponding independent claim and are therefore also allowable.

Claim 1 was rejected as follows:

Chiu disclose a method implementable on an encoder for adjusting a coding threshold for encoding a block in an image, wherein the coding threshold determines whether the block should be coded (Chiu: figure 3), comprising: encoding, at a first time, a first image representation of the block (Chiu: column 7, lines 10-20); encoding, at a second time later than the first time, a second image representation of the block (Chiu: column 7, lines 40-50); assessing the first and second blocks to determine whether the image is likely stationary (Chiu: column 9, lines 1-15), (Chiu: column 9, lines 50-60); and if the image is likely stationary, adjusting the coding threshold in the encoder for at least a portion of the block (Chiu: column 8, lines 40-55), as in claim 1. However, Chiu fails to disclose encoding using first and second encoding parameters and that the first and second parameters are quantization parameters, as in the claim. Divakaran discloses a method of feature extraction for compressed video sequence parameters such as quantization parameters (Divakaran: column 5, lines 15-25) for more efficient scene change processing at the encoder side (Divakaran: column 15, lines 30-57). Accordingly, given this teaching, it would have been obvious for one of ordinary skill in the art at the time of the invention to incorporate the Divakaran compressed video sequence parameter extraction into the Chiu method in order to accurately adjust the coding thresholds in accordance with detected scene changes. The Chiu method, now modified with the incorporation of the Divakaran compressed video sequence parameter extraction, has all of the features of claim 1. This rejection is not-well founded for at least the following reasons.

First, the rejection is defective because the combination of Chiu and Divakaran fails to teach or suggest “encoding at a first time, a first image representation of the block.” The rejection cites Chiu at col. 7, ll. 10–20 for teaching of this limitation. The cited portion of Chiu is reproduced below.

AT&T Bell Laboratories, 1995. In real video, the three factors are correlated with one another. A complete study on the determination of pixel-by-pixel threshold T based on the intensity values of the background pixels and local masking effects is described in detail in the above-referenced U.S. Pat. No. 5,746,278 to Berger et al.

Referring now to FIG. 2, an exemplary video encoder 100 is in accordance with an illustrative embodiment of the invention is shown. As is evident, the exemplary configuration of the video encoder 100 includes similar components as the video encoder 10 (FIG. 1), with the important exception of the novel inclusion of a perceptual preprocessor 110 in the encoder 100 of the invention. As such, a description of the functions of the similar components of FIG. 2 (with their reference designations incremented by 100 as compared to FIG. 1) will not be repeated as they were explained in detail above and are known in the art. As shown, the video encoder

At most this passage is suggestive of a video encoder. While Applicants do not dispute that Chiu teaches a video encoder, this cited passage clearly does not disclose “encoding at a first time, a first image representation of the block.”

Second, the rejection is defective because the combination of Chiu and Divakaran fails to teach or suggest “encoding, at a second time later than the first time, a second image representation of the block.” The rejection relies on Chiu at col. 7, ll. 40–50 for teaching of this second limitation of claim 1. The cited portion of Chiu is reproduced below.

encoder 120. The encoder 100 also includes a signal combiner 124 coupled to the inverse transformer 122, a delay 126 coupled to the signal combiner 124 and the perceptual preprocessor 110, and a motion compensator 128 coupled to the delay 126, the signal subtractor 114, the signal combiner 124, and the motion estimator 112.

From implication of the Weber-Fechner theory, we note that the values of residuals that do not exceed the perceptual threshold T may not need to be corrected. If the residuals of the pixels inside a macroblock are small enough, then we can continue to use the previously displayed macroblock without updating and at no loss of perceived quality. Accordingly, the computational effort of motion estimation/compensation for such macroblock is saved or can be preserved for other macroblocks requiring more motion searches.

It is unclear exactly how this passage relates to the limitation at issue. This passage says nothing about coding anything a second time. In fact, the passage seems to suggest that things are not coded a second time by stating that “we can continue to use the previously displayed macroblock without updating and at no loss of perceived quality.”

Moreover, it is clear from apparent lack of any sort of temporal relationship between the two passages cited above that they do not relate to “encoding at a first time...” and “encoding at a second time....” Neither of the two cited passages describe encoding anything, much less

coding a first image representation and a second image representation of a block at two separate times.

Third, the rejection is defective because neither Chiu nor Divakaran teach or suggest “assessing at least the first and second encoding parameters to determine whether the image is likely stationary, wherein the first and second encoding parameters comprise at least first and second quantization parameters.” The rejection relies primarily on Chiu at col. 9, ll. 1–15 to meet this third limitation of claim 1. The cited portion of Chiu is reproduced below.

value, then that macroblock is not subjected to motion estimation/compensation. This results in a segmentation of a frame into macroblocks that have changed a visually perceptible amount from the previous frame and macroblocks that have not changed a visually perceptible amount from the previous frame. As a result, the computational effort otherwise associated with motion estimation/compensation of that macroblock is saved or may be allocated to motion estimation/compensation of another macroblock or some other encoder processing function. It is to be appreciated that the decision value n for the number of pixels surviving from bush-hogging or thresholding (β -function tests) may be set as a default value of zero in order to provide a perceptually distortion-free macroblock. However, we have observed that a video signal generated with a small, non-zero value n can be indistinguishable from a video signal generated with n equal to zero. It is to be appreciated that using a decision

Again, the cited passage appears to bear little, if any, relationship to the limitation at issue. This passage seems to be addressing changed vs. unchanged macroblocks, skipping unchanged macroblocks, and saving the computation that would be required to determine motion vectors for skipped macroblocks. However, this is plainly not “assessing at least the first and second encoding parameters to determine whether the image is likely stationary, wherein the first and second encoding parameters comprise at least first and second quantization parameters.” There is no assessment of encoding parameters discussed, nor is there any suggestion of determining whether the block is stationary. Whether a block is unchanged and whether the block is stationary are two different things.

As further regards this limitation, we note that the Examiner has conceded that Chiu fails to teach that the encoding parameters compared to determine whether the image is stationary “comprise at least first and second quantization parameters” and that he relies on Divakaran at col. 5, ll. 15–25 and col. 15, ll. 30–57 for this teaching. The relevant portions of Divakaran are reproduced below.

That is, for each object/frame, two “compression complexity matrices” are constructed which comprise, respectively, the number of bits required for encoding the motion vectors and the number of bits required for encoding the residuals of each macroblock in the object/frame.

Thus $C_m = \{R_{m,i}(j,j)\}$ and $C_{res} = \{R_{res,i}(j,j)\}$ are the rate matrices corresponding to the motion vectors and the residuals, respectively. The Quantization Parameter Q P for each of the blocks is also stored in a matrix Q.

For simplicity, if only P frames/objects are considered, the bit allocation based descriptor for a frame is constructed according to the following steps.

1. If a macroblock of the P-frame is encoded as an Intra Block, then its motion vector bit expenditure is set to zero and its residual bit expenditure is set to the bits spent on the intra coding. This is done because intra-coding can be

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This first passage of Divakaran does mention quantization parameters, but nothing in this passage teaches or suggests “assessing at least the first and second encoding parameters to determine whether the image is likely stationary, wherein the first and second encoding parameters comprise at least first and second quantization parameters.” It is insufficient to merely find common words used in a reference. The reference must teach or suggest the limitation. This portion of Divakaran plainly fails to teach assessing the quantization parameters to determine whether the image is likely stationary, and thus fails to teach or suggest the third limitation of claim 1.

for the shot. The first few frames may be skipped to let the 30 rate control settle down from a scene transition.

The average bit expenditure on motion vectors per macroblock, as well as the average compression complexity per macroblock can serve as matching criteria that help rank the candidates. The run-length information in each representation then can be used to further rank the candidates. Thereafter, equally indexed run-lengths are compared, i.e. compare the run-lengths of short, intermediate and long lengths of frame/object A with the corresponding run-lengths of frame/object B. The invention has been described 35 in terms of matching of single shots from diverse program sources. However, it should be recognized that it is within the scope of the present invention to apply the foregoing techniques to collections of shots, each collection coming from a single program source. For example, an action movie 40 would have several high motion-complexity shots in a row while a more sedate movie would have a number of low spatio-temporal complexity shots in a row. These characteristics could be logged and used to provide matching criteria.

It should also be noted that the sequence of steps as set 45 forth above do not necessarily occur in close time proximity to each other but may, in fact, be separated in time. In particular, the descriptor can be developed and attached to the program material and, at a later time, it may be used to find matches. In any event, such activities are considered to 50 be within the scope of the present invention.

Thus, while the present invention has been described in terms of a preferred embodiment and various modifications thereof, it will be understood by those skilled in this art that additional modifications may be made without departing 55 from the scope of this invention which is set forth in the accompanying claims.

This second passage seems to bear even less relationship to the limitation at issue than the first passage reproduced above. Nothing in this passage at all relates to assessing quantization parameters to determine whether an image is likely stationary, which is the proposition for which it is purportedly cited. In any case, it is clear that the cited passages of Divakaran, whether taken alone, together, or in conjunction with Chiu, fail to teach or suggest "assessing at least the first and second encoding parameters to determine whether the image is likely stationary, wherein the first and second encoding parameters comprise at least first and second quantization parameters," as required by claim 1.

Fourth, the rejection is defective because the combination of Chiu and Divakaran fails to teach or suggest “if the image is likely stationary, adjusting the coding threshold in the encoder for at least a portion of the block.” The rejection relies on Chiu at col. 8, ll. 40–55 as teaching this limitation of claim 1. The cited portion of Chiu is reproduced below.

physical experimentation. It is to be understood that, given the teachings of the invention, one of skill in the art will contemplate other methods of modeling the threshold function.

In any case, the δ-function tests result in an intensity difference value being obtained for each comparison of a pixel in $F_g(x)$ with a corresponding pixel in $F_{g+1}(x)$. If this intensity difference value is greater than the perceptual threshold T , then a value of one (1) is assigned to the comparison, else a value of zero (0) is assigned. It is to be appreciated that the δ-function tests may be performed on an entire frame or on one or more macroblocks at a time.

§8 Next, in step 306, for the i th macroblock B_i of the current frame, the results of the δ-function test on every pixel $x \in B_i$ are collected such that if:

$$§8 \quad \sum_{x \in B_i} \delta(x) = \begin{cases} > n, & \text{then } B_i \text{ will be motion compensated} \\ \leq n, & \text{then } B_i \text{ will be skipped.} \end{cases} \quad (3)$$

As noted above, none of the cited passages of Chiu and Divakran teach or suggest anything about determining whether the image is likely stationary. We note that this cited passage equally fails to teach or suggest determining whether the image is likely stationary, much less adjusting a coding threshold if the image is likely stationary. At best, the cited passage teaches some sort of perceptual threshold “ T ” that in some way relates to whether the block will be motion compensated or skipped. This passage plainly fails to teach or suggest that the threshold is adjustable or that it is adjusted in response to an assessment of whether the image is likely stationary.

Because the proposed combination of Chiu and Divakaran fails to teach or suggest each limitation of the pending claims, the rejection of these claims as obvious over Chiu in view of Divakaran is improper.

Moreover, we note that the rejection provides no logical reason that one of ordinary skill in the art would be motivated to combine Chiu and Divakaran. The mere conclusory statement that “it would have been obvious for one of ordinary skill in the art ... to incorporate the Divakaran compressed video sequence parameter extraction into the Chiu method ... to accurately adjust the coding thresholds...” is insufficient. First, as clearly noted above, neither reference appears to teach adjustment of coding thresholds. Second, Chiu appears to relate to

methods of increasing the efficiency of encoding a bitstream by skipping the motion compensation step for certain macroblocks that are skipped, while Divakaran appears to be looking at an already-encoded video sequences to identify changes such as scene transitions, etc. without having to decode the video. Neither of these concepts appear to relate at all to the present claims, nor do they appear to be related to each other.

In view of the foregoing, withdrawal of the rejections and a Notice of Allowance for all pending claims are requested.

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Respectfully submitted,

January 31, 2008

Date

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